CLAIMS

1. A multiple-input multiple-output (MIMO) wireless communications system comprising:

   (i) a plurality of transmit antenna elements; and

   (ii) a plurality of receive antenna elements;

   wherein the transmit antenna elements are arranged to provide polarisation diversity and wherein the positions of the transmit antenna elements are arranged, such that spatial diversity is avoided.

2. A MIMO wireless communications system as claimed in claim 1 wherein each of said transmit antenna elements is polarised at one of two first substantially orthogonal polarisations.

3. A MIMO wireless communications system as claimed in claim 2 wherein each of said receive antenna elements is polarised at one of two second substantially orthogonal polarisations.

4. A MIMO wireless communications system as claimed in claim 3 wherein said two first substantially orthogonal polarisations are different from said two second substantially orthogonal polarisations.

5. A MIMO wireless communications system as claimed in claim 1 wherein said plurality of transmit antenna elements comprises one or more dual-polar-elements each such dual-polar-element being two co-located antenna elements operable from a single antenna aperture.

6. A MIMO wireless communications system as claimed in claim 1 wherein said plurality of transmit antenna elements is provided by an antenna array.

7. A MIMO wireless communications system as claimed in claim 1 which is arranged to operate at a particular wavelength and wherein the inter-element spacing of the transmit antenna elements is less than one of the particular wavelength.

8. A MIMO wireless communications system as claimed in claim 1 which is arranged to provide non-MIMO communications in addition to MIMO communications.

9. A MIMO wireless communications system as claimed in claim 1 wherein said transmit antenna elements are together arranged to provide a plurality of antenna beams in use.

10. A MIMO wireless communications system as claimed in claim 9 wherein said plurality of antenna beams are provided using one or more beamformers integral with the transmit antenna elements.

11. A MIMO wireless communications system as claimed in claim 9 wherein said plurality of antenna beams comprises pairs of antenna beams, each pair comprising a first antenna beam of a first polarisation and a second antenna beam, substantially identical to the first but provided at a second polarisation different from the first polarisation.

12. A MIMO wireless communications system as claimed in claim 11 wherein each of said pairs of antenna beams is arranged to provide a two-branch MIMO input.

13. A MIMO wireless communications system as claimed in claim 1 which is selected from a 2:2 and a 2:4 MIMO system.

14. A MIMO wireless communications system as claimed in claim 1 which is selected from a fixed wireless access system, a personal area network, a wireless local area network, and a mobile communications network.

15. A MIMO wireless communications system as claimed in claim 1 wherein each of said transmit antenna elements comprises a column of antenna elements.

16. A multiple-input multiple-output wireless communications method comprising the steps of:-

(i) transmitting a space-time coded signal from a transmit antenna arrangement comprising a plurality of transmit

antenna elements arranged such that polarisation diversity is provided and spatial diversity is avoided; and

(ii) receiving the space-time coded signal at a receive antenna arrangement comprising a plurality of receive antenna elements.

17. A method as claimed in claim 16 which further comprises:

(i) positioning the transmit antenna arrangement and the receive antenna arrangement such that a line of sight path is present between those two arrangements; and

(ii) using said transmit antenna arangement to transmit the space-time coded signal to the receive antenna arrangement at least partly along said line of sight path.

18. A method as claimed in claim 16 which further comprises transmitting a non-space-time coded signal from the transmit antenna arrangement simultaneously with the space-time coded signal.

19. An antenna arrangement for use in a multiple-input multiple-output (MIMO) wireless communications system, said antenna arrangement comprising a plurality of transmit antenna elements arranged to provide polarisation diversity and wherein the positions of said transmit antenna elements are such that spatial diversity is avoided.

20. An antenna arrangement as claimed in claim 19 which is arranged to operate at a particular wavelength and wherein the inter-element spacing of the transmit antenna elements is less than one of the particular wavelength.

21. An antenna arrangement as claimed in claim 19 which is also suitable for use in a non-MIMO communications system simultaneously with use in the MIMO communications system.

22. A method of operating an antenna arrangement as claimed in claim 19 which comprises transmitting space-time coded signals from said antenna arrangement.

23. A method of operating an antenna arrangement as claimed in claim 19 which further comprises a plurality of receive antenna elements and wherein said method comprises receiving space-time coded signals at said antenna arrangement, said signals being polarisation diverse and having a substantially insignificant amount of spatial diversity.